PULP & PAPER

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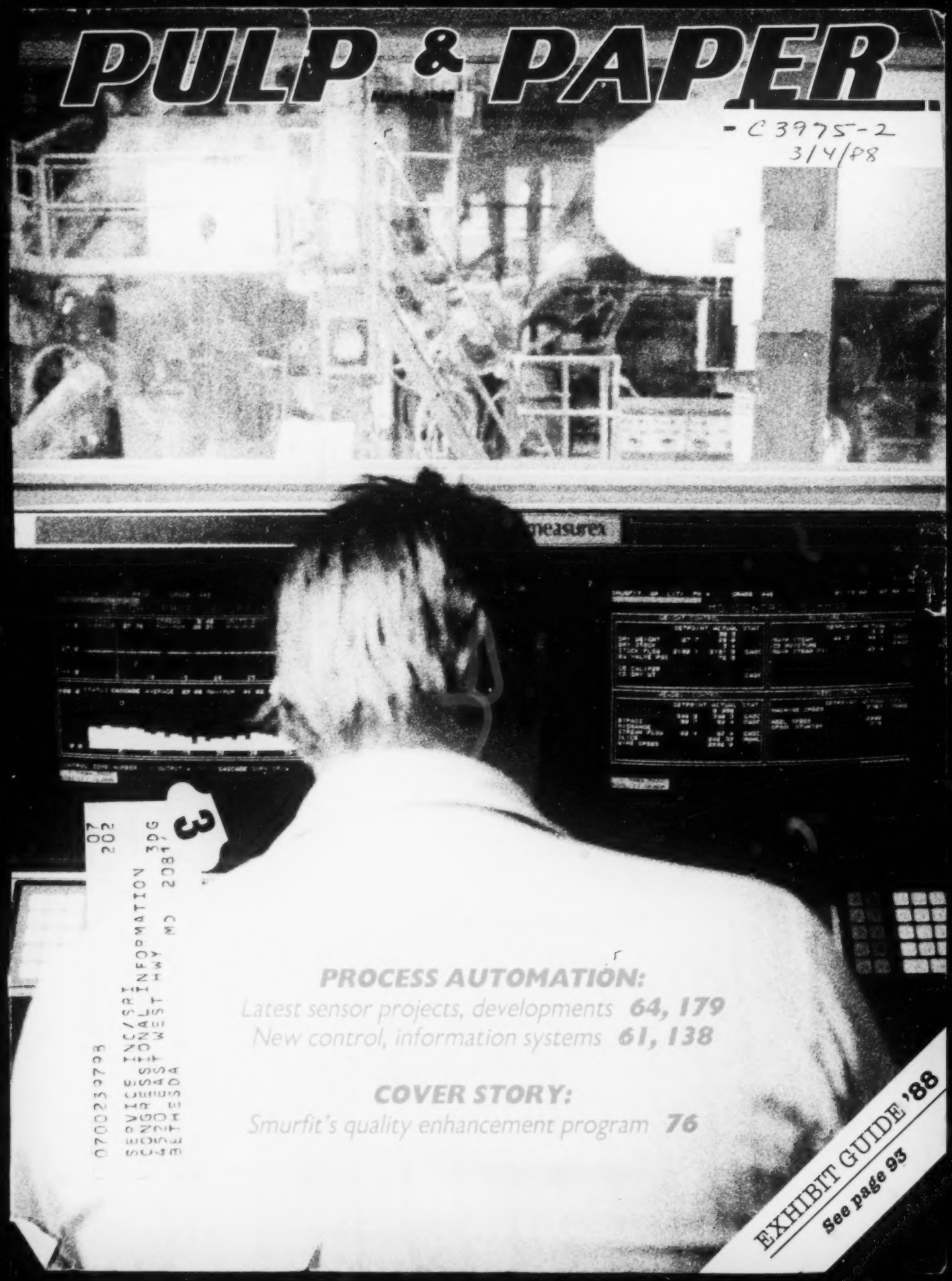

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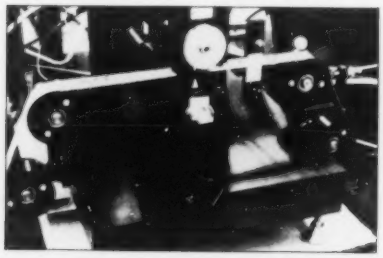

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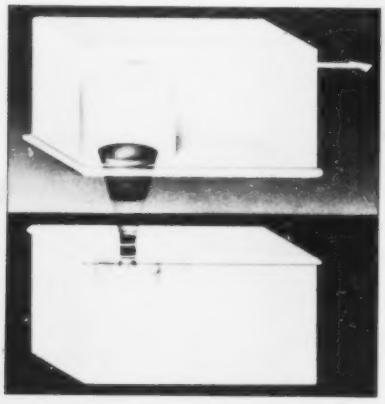

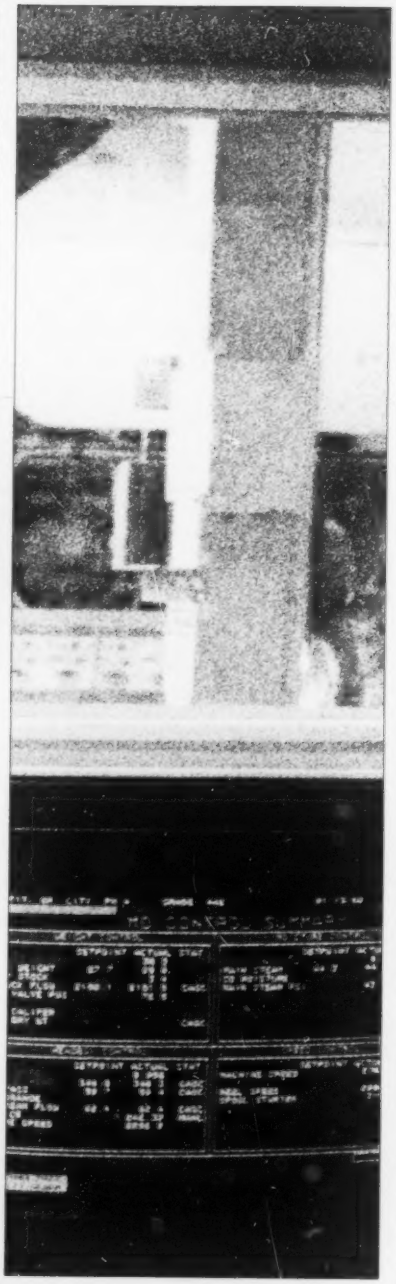

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Smurfit Newsprint's Oregon City, Ore., mill is using the latest control technology to assure quality production. (Photo courtesy of Measurex Corp.)

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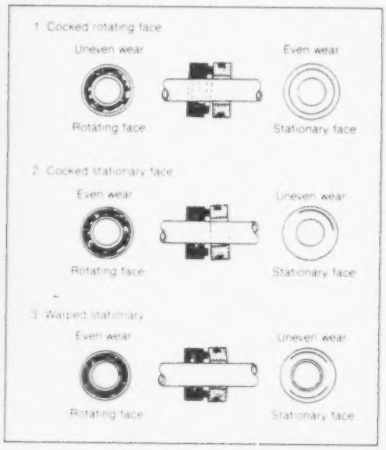

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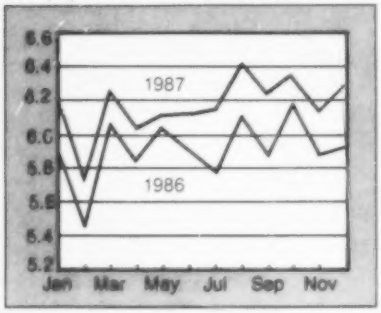
U.S. paper and board production



U.S. production of paper and paperboard totaled 6.3 million tons in December 1987, up 7.0% from the same month in 1986, according to the American Paper Institute. Production set a new record in 1987, rising 5.1% over 1986 and finishing the year at a record 74.5 million tons, equivalent to 95% of reported capacity. Paperboard posted a final total of 37.5 million tons for the year, up 5.9% from 1986. Paper was also strong, rising 4.3% to finish the year at 37.0 million tons.

Among major grades, printing and writing papers were mainly responsible for the increase in paper output, with coated paper up 9.7% from 1986 and uncoated free-sheet up 5.5%. Strong shipments are expected to continue into 1988, thanks to a strong backlog of unfilled orders, API said. In the paperboard sector, record fiber box shipments boosted containerboard production for domestic use up 7.5% from 1986.

Canadian newsprint shipments ended the year at 9.8 million metric tons, up 4.9% from 1986. Operating rates reached 97% for the year, up from 94% in 1986. Woodpulp shipments also finished the year strongly, rising 4.9% from 1986. Operating rates jumped to 95%, up from 91% the previous year. ■

	Latest month (000 short tons)		% change from year ago	Annualized year-to-date (000 short tons)	% change from year ago
PAPER & PAPERBOARD PRODUCTION[1]					
Newsprint	Dec.	499	5.7	5,842	3.8
Uncoated groundwood (s)	Dec.	110	-11.3	1,491	-3.2
Coated paper (s)	Dec.	592	9.6	6,869	9.7
Uncoated free sheet (s)	Dec.	960	9.0	10,983	5.5
Other printing/writing	Dec.	122	13.0	1,407	1.7
Total packaging and other paper (s)	Dec.	418	-1.4	5,055	-1.2
Tissue	Dec.	475	12.8	5,341	4.8
Total paper	**Dec.**	**3,177**	**7.0**	**36,987**	**4.3**
Unbleached kraft paperboard	Dec.	1,642	7.3	18,889	6.8
Semichemical medium	Dec.	450	2.7	5,605	4.3
Bleached paperboard	Dec.	382	4.7	4,405	3.2
Recycled paperboard	Dec.	691	10.6	8,594	6.3
Total paperboard	**Dec.**	**3,165**	**7.0**	**37,493**	**5.9**
Total U.S. paper and paperboard output	**Dec.**	**6,342**	**7.0**	**74,480**	**5.1**
PULP, WASTEPAPER & FIBER[2]					
Total U.S. woodpulp production	Nov.	4,812	1.2	59,370	4.4
Market pulp production	Nov.	670	13.0	8,070	7.5
Wastepaper consumption at paper/board mills	Nov.	1,553	10.3	18,391	6.4
Pulpwood consumption (cords)	Nov.	7,401	-3.6	93,583	2.6
CONVERTED PRODUCTS STATISTICS[3]					
Corrugated box shipments (billion ft²)	Dec.	23.141	5.1	297.430[6]	4.8
Containerboard inventories at U.S. box plants and mills	Dec. 1	2,399	12.4		
INTERNATIONAL TRADE[2]					
U.S. paper imports (including products)	Nov.	1,113	-1.9	12,565	7.0
Imports of Canadian newsprint	Nov.	728	-5.1	8,639[6]	3.0
U.S. paper exports (including products)	Nov.	398	0.5	5,167	13.6
Exports of unbleached kraft linerboard	Nov.	147	-10.4	2,189	8.4
Exports of woodpulp	Nov.	365	17.0	4,760	7.8
Norscan pulp inventories[4]	Dec. 31	691	-20.6		
Norscan pulp operating rates[4]	Dec.	99%	96%	97%	91%
CANADIAN STATISTICS[5] *(reported in metric tons)*					
Total newsprint shipments	Dec.	887	8.8	9,756[6]	4.9
Operating rates	Dec.	97%	97%	97%	94%
Inventories held by U.S. consumers	Dec. 31	1,382	8.9		
Other paper/board shipments	Dec.	519	7.0	6,381	6.2
Woodpulp shipments (export only)	Dec.	759	10.0	8,063	4.9
Operating rates	Dec.	90%	87%	95%	91%

1. American Paper Institute. 2. API, Bureau of Census, American Pulpwood Assn. 3. Fibre Box Assn., Paperboard Packaging Council. 4. North American/Scandinavian paper-grade market pulp. 5. Canadian Pulp & Paper Assn. 6. Not annualized. (s) = Shipments.

Coated free-sheet: Olympics and presidential campaign help buck up markets

Grade structure: Coated free-sheet papers are made from no more than 10% groundwood pulp, most commonly stone groundwood; the balance is chemical pulp. The highest quality coated papers, Nos. 1 and 2, have no groundwood content at all, while Nos. 3 and 4 may contain none or small amounts. Half of No. 4 paper is excluded from the free-sheet category because of groundwood pulp content.

Almost 86% of coated free-sheet paper is coated two-side (C2S). Most of the 420,000 tpy of coated one-side paper (C1S) is free-sheet.

Basis weights for premium coated Nos. 1 and 2 are usually between 60 lb and 100 lb, while Nos. 3 and 4 generally are in the 25-to-90-lb area. About 40% of coated Nos. 3 and 4 fall below 60 lb. Commercial printers use most of the coated free-sheet paper. Major end uses are annual reports, catalogs, and other advertising and promotional materials. Magazines use coated papers for cover stock and higher-grade interior pages in high-quality publications. Magazine publishers use about 10% of the No. 3 grade paper.

Surface finishes on coated papers include glossy, dull, matte, and embossed. Measurements of these finishes (Gardner glossmeter) are 45 or more for glossy, as low as 25 for dull, and 20 or below for matte.

About 85% of all coated paper is glossy. Other projections break down among the grades as: No. 1 is 65% glossy and 25% dull, with a fraction matte and embossed; No. 2 is about 80% glossy and 16% dull; and No. 3 is 63% glossy, 33% matte, and 3% dull. Embossed represents less than 2% of any grade.

Production/capacity: Operating rates in 1987 were about 95%. Shipments of coated free-sheet from U.S. mills rose to about 3.08 million tons, an increase of 10.8% from 1986.

Capacity increased almost 10% in 1987 with additional tonnage at Scott Paper Co.'s S.D. Warren Div. in Skowhegan, Maine—215,000 tpy (brought online at the end of 1986); Westvaco Corp., Luke, Md.—30,000 tons; Mead Corp., Escanaba, Mich.—20,000 to 30,000 tons; and Consolidated Papers Inc.'s Biron Div.—60,000 tons switched from coated groundwood.

Outlook: The paper industry is expected to do slightly better than the economy in general. In 1988, real growth of the GNP is pegged at about 2.0%, slightly lower than the 2.7% in 1987, according to *Blue Chip Economic Indicators*. Coated free-sheet demand probably will grow about 4% to 4.5%.

Economists do not fear a recession in 1988 until the end of the year or, more likely, in 1989. Boosting the coated markets will be advertising for the 1988 Olympics and the U.S. presidential campaign.

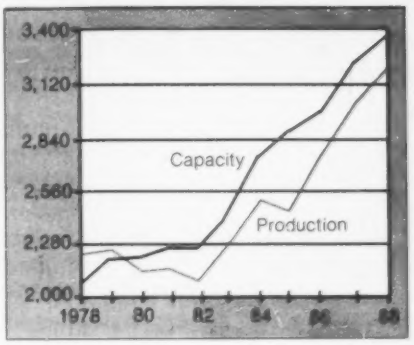
Capacity will rise about 4.8%, with new tonnage coming online in the fall at Midtec Paper Corp.'s Kimberly, Wis., mill (205,000 tpy) and the final 30,000 tpy of a 150,000-tpy expansion at Westvaco Corp.'s Luke, Md., mill. Potlatch is rebuilding its Cloquet, Minn., mill, but the project is not expected to add significantly to the mill's 146,000-tpy capacity. Champion International Corp. recently announced plans to move ahead with installation of a 265,000-tpy coated free-sheet machine at its Quinnesec, Mich., market pulp mill for startup in late 1990.

Prices: Coated free-sheet producers headed into 1988 with their machines running virtually full out, creating an opportune time to raise prices, which began their upswing in mid-1987. A $40 to $50/ton price increase was announced for Feb. 1 on web grades, particularly Nos. 3 and 4. This would bring No. 3 60-lb in rolls to about $1,150/ton. A hike on sheets, especially No. 1, was less certain.

Typical historical pricing trends ($/short ton, average price for year) are as follows for 70-lb No. 1 sheets: 1979, $939; 1980, $1,021; 1981, $1,096; 1982, $1,148; 1983, $1,213; 1984, $1,321; 1985, $1,375; 1986, $1,350; and 1987, $1,410. For No. 3 rolls: 1979, $690; 1980, $750; 1981, $798; 1982, $798; 1983, $830; 1984, $919; 1985, $980; 1986, $940 to $950; 1987, $980.

Markets: Commercial printing remains the largest consumer of C2S paper, while C1S is used primarily by label converters and wrap manufacturers. A substantial minority of No. 4 goes to magazine publishers, as does No. 3, either of which can be used for magazine cover stock. ■

SUPPLY/DEMAND (000 tons)



FORECAST (000 tons)

	1985	1987e	1988e
Production[1]	2,781	3,080e	3,219
Capacity[2]	2,944	3,237	3,393
Utilization rate	94.5	95.1	95.0
Imports	100	114	125
Exports	42	52	58
Apparent U.S. consumption	2,839	3,142	3,286
lb/capita	23.58	25.85	26.79
GNP ratio	0.67	0.70	0.69

e = Estimate.
1. P & P estimate.
2. American Paper Institute.

TOP U.S. PRODUCERS (000 tpy)

	Annual capacity	Market share (%)
1. Scott Paper[1]	900	26.5
2. Westvaco	500	14.7
3. Mead Corp.	395	11.6
4. Simpson	290[2]	8.5
5. Champion	285[2]	8.4
6. Consolidated	270[2]	8.0
7. Potlatch[3]	270	8.0
8. Midtec	177	5.2
9. Newton Falls	100	2.9
10. Boise Cascade	75	2.2

Market share of top five companies:
69.7%

Market share of top ten companies:
96.0%

Total U.S. capacity (1988):
3.393 million tons

1. S.D. Warren Div.
2. *P & P* estimate.
3. Northwest Div., production.

SALES & EARNINGS

Profits jumped 46% on 20% increase in sales

The U.S. pulp and paper industry will look back on 1987 as one of the most profitable years in its history. Earnings for the year surged 45.8% on a 19.7% increase in sales. The profit surge was a reflection of strong demand that resulted in full capacity operation and price increases in most grade segments. Industry cost cutting measures and productivity improvement programs implemented over the last several years also contributed to the increase.

"A major external factor affecting sales and earnings favorably in 1987 was the decline of the dollar in relation to other major currencies," noted Weyerhaeuser Co. chairman and CEO George H. Weyerhaeuser. "Sharply higher dollar prices of pulp and paper products traded in the world markets drove margins for these products to their highest levels in the 1980s," he told shareholders of Weyerhaeuser Co.

Most of the paper industry executives are bullish on at least the first half of 1988, due to the current momentum seen in the industry. Mills are operating virtually at capacity in many grades, inventories are at moderate to low levels, and many of the price increases that were announced for the first quarter appear likely to hold.

In addition, companies this year will also be benefiting from the price increases that were implemented on the majority of grades in the second half of 1987 and from lower tax rates. As George Adler, an industry analyst with Smith Barney Harris Upham Co., puts it, "Price cutting [in a possible recession] would have to be very severe in order for paper companies to earn less in 1988 than they did in 1987."

G-P still No. 1. With sales of $8.6 billion, Georgia-Pacific Corp. had the highest sales in the industry. Earnings for the year amounted to $458 million, a 55% increase, which set a record for the company. Chairman and CEO T. Marshall Hahn Jr. commented, "Demand for pulp and many paper and board products allowed us to operate our mills at or near capacity for most of the year. Strong demand for linerboard and uncoated free-sheet and our expanded capacity in these products contributed substantially to profitability."

International Paper Co. showed a 33.4% increase in earnings on a 42% increase in sales. Earnings for the quarter were 10.6% above the year-earlier level. The effect of the ongoing strikes at three of IP's mills and a lockout at another mill is reportedly diminishing.

James River Corp. ended its second quarter on Oct. 25 with a 48% increase in profits. The company noted

TABLE 1: **Most forest products companies enjoyed healthy earnings in 1987.**

	Full year ($000)			
Paper companies	**Sales**	**Change 1987/86**	**Earnings[1]**	**Change 1987/86**
Boise Cascade Corp.	$3,820,810	2.2%	$182,990	60.2%
Bowater Inc.	1,231,002	33.8	81,140	64.1
Champion International	4,614,723	5.2	293,321[2]	46.1
Chesapeake Corp.	675,713	12.7	30,153	119.5
Consolidated Papers Inc.	742,835	13.8	95,798	9.4
Federal Paper Board Co.	1,025,727	8.1	65,763[2]	257.2
Georgia-Pacific Corp.	8,603,000	19.1	458,000[2]	54.7
Great Northern Nekoosa Corp.	2,589,000	27.0	200,600[2]	88.3
International Paper Co.	7,800,000	41.8	407,000[2]	33.4
James River Corp. (10/25)[3]	1,236,152	10.8	53,429	47.9
Jefferson Smurfit Corp.	1,099,465	16.4	91,996	228.5
Kimberly-Clark Corp.	4,900,000	14.0	325,000	30.9
Longview Fibre Co. (10/31)	569,399	16.8	65,166	94.6
Louisiana-Pacific Corp.	1,921,600	27.6	125,000[2]	–33.2
Mead Corp.	4,208,800	30.8	218,200[2]	99.6
Mosinee Paper Corp.	215,982	10.5	5,714	22.1
Pentair Inc.	739,245	26.5	21,860	43.6
Pope & Talbot Inc.	426,908	37.6	28,129	77.9
Potlatch Corp.	992,077	1.6	87,623	25.3
Scott Paper Co.	4,122,000	19.9	233,800	25.4
Sonoco Products Co.	1,312,052	36.1	61,482[2]	12.4
Temple-Inland Inc.	1,602,700	23.7	141,400[2]	75.0
Union Camp Corp.	2,307,599	12.8	207,483[2]	57.1
Wausau Paper Mills Co. (11/30)[3]	88,884	10.5	3,736	25.5
Westvaco Corp. (10/31)	1,903,606	5.1	146,191[2]	35.2
Weyerhaeuser Paper Co.	6,989,829	23.6	446,623	61.4
Willamette Industries Inc.	1,431,624	19.3	121,339	62.5
Total	**$65,895,696**	**19.9%**	**$4,141,771**	**45.8%**

n.m. = Not meaningful.

1. Income after taxes, from continuing operations, excluding most significant nonrecurring items in both years.

2. **Champion International:** 1987 earnings exclude a net gain of $88.7 million from the sale of investments in Stone Container Corp. and U.S. Plywood Corp. **Federal Paper Board:** Year net includes $8.2-million after-tax charge for retirement of debt. Year-earlier net for quarter and year include $15.1-million charge for debt retirement. **Georgia-Pacific:** 1987 net income includes a $66-million pretax gain from sale of investments in Georgia-Gulf Corp., and 1986 earnings include a $33-million pretax gain for the same reason. **Great Northern Nekoosa:** 1986 net excludes a net charge of $21.2 million from restructuring. **International Paper:** 1986 net income for quarter and year includes pretax gains totaling $73 million partly offset by a pretax charge of $31 million from relocations and plant closing costs. **Louisiana-Pacific:** Year-ago net for quarter and year includes a $123.0-million pretax credit from the reversal of income taxes. **Mead:** 1986 net excludes $65.9-million charge from discontinued operations. **Sonoco Products:** Net for 1987 year and quarter includes a $10-million pretax charge related to consolidation costs. **Temple-Inland:** 1987 includes gain on property and equipment of $4.1 million. 1986 includes $4.5-million gain for same. **Union Camp:** 1986 year and quarter exclude a $5.1-million net gain on sale of a facility and a $3.0-million net charge from repurchase of debt. **Westvaco:** 1987 year and quarter net includes a $12.4-million credit from sale of timberlands.

3. Results are for quarter only and are not included in total.

that earnings increased in tissue, disposable food service, and paperboard packaging but that they were flat for communication papers and were lower in specialty papers and flexible packaging.

Paperboard profits surge. Profits of companies heavily involved in containerboard and bleached board increased dramatically. Jefferson Smurfit Corp. reported that its net income for the year more than tripled to $92 million for the year on sales of $1.1 billion. Smurfit's equity in Container Corp. of America, its 50%-owned affiliate, amounted to $44.5 million in 1987, reflecting cost reduction programs as well as improved market conditions.

Union Camp Corp.'s profits surged 59.7% for all of 1987 to $207.5 million on sales of $2.3 billion. Strong demand and prices for linerboard as well as improving markets for white papers were behind the strong results. Federal Paperboard Co.'s income jumped 120% to nearly $74 million for 1987 before an extraordinary $8.2-million charge from retirement of debt.

Publication papers prosper. Some makers of publication papers got off to a slow start in 1987, although most of them finished the year with earnings that were more than satisfactory. Mead Corp. came close to doubling its earnings for the year. The company said that its pulp mills have been sold out since mid-1987. Mead said that prices for coated and uncoated paper began to recover in the second half and demand for carbonless copy paper remained strong throughout the year.

Boise Cascade Corp. almost doubled its 1987 earnings. Bowater Inc. additionally reported record sales and earnings for the year. The company attributed the good showing to a recovery in newsprint prices and also to two price increases on coated paper that were implemented during the second half as new capacity was fully absorbed.

Tissue profits rise. For the first time in the company's history, Scott Paper Co.'s 1987 sales passed $4 billion, and earnings of $233 million also set a record. Scott said that its operating results in Europe were "excellent" but that earnings of its sanitary papers business in the U.S. showed little growth because of the extremely competitive environment of the market place. ■

EXPANSIONS

Weyerhaeuser studying pulp expansion at Columbus mill

Weyerhaeuser Co. is studying the feasibility of building a kraft pulping facility at its lightweight coated paper mill in Columbus, Miss. If constructed, the addition probably would produce approximately 1,150 to 1,200 tpd, with almost 1,000 tons available for sale.

Columbus currently has a 220-tpd thermomechanical pulp mill and a 500-tpd paper machine that started up in 1982. Needed chemical pulp is transferred from other company mills or is purchased. If approved in the first half of this year, the pulp mill could come onstream in 1990. The original three-phase plan for Columbus was to add a kraft pulp mill plus an uncoated free-sheet machine to be followed later by a second coated groundwood paper machine. The latter two stages were indefinitely postponed in 1982 due to unfavorable economic conditions, but some of the infrastructure work for them was completed. ■

F.F. Soucy to rebuild groundwood machine

F.F. Soucy Inc. et Associes is rebuilding its No. 2 newsprint and groundwood papers machine at Rivières-du-Loup, Que., boosting capacity by 20,000 metric tpy. In addition, the C$57.3-million project includes improvements to the thermomechanical pulp (TMP) mill and woodroom. These projects are slated for completion in late 1988.

Additional projects slated to come online in 1989 include the replacement of the fourdrinier on No. 1 newsprint machine, which with other improvements will add 4,000 tpy. This $3-million project will be completed in September 1989. No. 1 machine is scheduled to be shut down for only two working days, taking advantage of the New Year's shutdown period in 1988/89.

The company also is considering a plan to rework No. 1 press section and is installing a new pickup combination press, adding 9,000 tpy. This project would cost about C$7 million and would be completed in September 1991.

The rebuild of No. 2 newsprint/groundwood machine will increase speed to 4,000 fpm. Currently, No. 2 capacity is about 400 to 410 metric tpd. No. 2 produces mostly newsprint, along with small amounts of high-brightness news and 22.5-lb directory paper.

New equipment includes both a Valmet-Dominion hydraulic headbox and twin-wire former as well as a Tri-Vent press section. No. 2 will be shut down in August and will restart after Labor Day, said mill spokesman Jean-Luc Gaudreau. The TMP mill will get new screening and cleaning systems. These projects will cost about C$35 million. Cowan Lovalin Inc. is engineering the No. 2 rebuild and the TMP improvements. ■

Champion to build new coated free-sheet machine

Champion International Corp. is set to move ahead with construction of a 265,000-tpy coated free-sheet paper machine at the company's new pulp mill in Quinnesec, Mich. The decision to go ahead was made after the company was able to resolve issues of taxation and environmental permits with government agencies.

Installation of the Beloit machine will begin in the spring of 1989 with startup likely in late 1990, a company spokesman said. No. 41 machine will have a 280-in. trim and will be able to run at speeds up to 3,500 fpm. In addition to the paper machine, the company will install two coaters but no sheeting equipment, since paper will be sold in rolls. Employment at the mill will be increased by about 100 workers.

The machine will use less than half of the mill's production of 750 tpd of bleached hardwood kraft pulp. The majority of the remaining pulp will be available for sale on the open market. ■

K-C to install another new machine at Neenah

Kimberly-Clark Corp. announced its plans to install a 30,000-tpy paper machine at its Neenah Paper Div.'s mill in Whiting, Wis. The project would cost $25 million and would increase capacity by about 25%, according to K-C chairman and CEO Darwin E. Smith.

This follows the installation of a

PRODUCTION

Canadian paper industry set output record

Total shipments of pulp and paper increased 5.2% to a record 24.2 million metric tons in 1987, according to the Canadian Pulp & Paper Assn.'s year-end statistics. The Canadian industry's stellar performance was boosted by the strong worldwide demand and the high prices for pulp, newsprint, and printing/writing papers. The industry as a whole operated at 98% of capacity.

Market pulp shipments rose 4.9% to 8.1 million tons. Most of the market pulp produced in Canada is exported, thus making Canada the world's largest market pulp supplier. The U.S. is by far the major export market, accounting for 3.6 million tons. Canada is the main foreign supplier to the U.S., with about 25% of pulp shipments going directly to subsidiary and affiliated companies in the U.S.

Strong U.S. demand and new capacity in Canada contributed to a 43% gain in shipments of book and writing papers to U.S. customers. Shipments of book and writing papers to the U.S. totaled 404,00 tons last year, up from 283,000 tons in 1986 and only 227,000 tons in 1984.

Shipments to U.S. jump. Modest gains were posted for kraft linerboard shipments, which increased 2.6%, boxboard shipments, up 2.6%, kraft paper shipments, up 2.4%, and tissue shipments, up 1.1%. On an international scale, Canadian producers are less competitive in these grades and sell most of their output in the domestic market.

Canadian exports of some of these packaging grades to the U.S., however, have jumped sharply over the past several years, partly due to tight U.S. supply. For example, Canadian exports of kraft paper last year totaled 165,000 tons, up from 134,000 tons in 1985 and only 55,000 tons in 1984. Containerboard shipments to the U.S. have also been on the rise, hitting 181,000 tons in 1987, up from 165,000 tons in 1986 and 98,000 tons in 1985.

In 1987, the weak Canadian dollar contributed to the industry's competitiveness vis-à-vis Scandinavian and U.S. producers, leading to a 5.8% gain in total export shipments. The rising value of the Canadian dollar against the U.S. dollar in the first months of 1988, however, will hurt producers. ■

TABLE 2: **Canadian exports increased 5.2% in 1987.**

Canadian pulp/paper/paperboard shipments
(000 metric tons)

	1984	1985	1986	1987
Woodpulp[1]	6,700	7,008	7,684	8,063
Newsprint	9,018	8,996	9,302	9,756
Uncoated groundwood	907	1,040	1,219	1,338
Book and writing	1,022	1,081	1,176	1,314
Tissue and specialty	403	455	467	472
Kraft papers	426	475	549	562
Boxboard	738	703	725	744
Linerboard	1,085	1,137	1,223	1,255
Corrugating medium	607	558	651	696
Total	**20,906**	**21,453**	**22,995**	**24,200**
% change	**5.5%**	**2.6%**	**7.2%**	**5.2%**

1. Does not include domestic paper-grade pulp shipments.
Source: Canadian Pulp & Paper Assn.

1987 Canadian pulp/paper/paperboard shipments
(000 metric tons)

	Canada	U.S.	Other	Total
Woodpulp[1]	—	3,582	4,481	8,063
Newsprint	1,183	7,086	1,487	9,756
Uncoated groundwood	201	1,059	78	1,338
Book and writing	881	404	28	1,314
Tissue and specialty	408	56	8	472
Kraft papers	243	165	154	562
Boxboard	664	78	2	744
Linerboard	931	75	250	1,255
Corrugating medium	477	106	113	696
Total	**4,988**	**12,911**	**6,602**	**24,200**
% of total	**20.6%**	**53.1%**	**27.3%**	**100%**

1. Does not include domestic paper-grade pulp shipments.
Source: Canadian Pulp & Paper Assn.

Daishowa's Alberta mill

At press time, the Alberta government announced that it will spend C$65.2 million for access by rail and road to Daishowa Paper Manufacturing Co.'s planned bleached kraft pulp mill near Peace River, Alta., and the Canadian federal government will spend $9.5 million in order "to facilitate the mill's infrastructure."

Construction on the $500-million project is expected to begin this spring. When completed in 1990, the 340,000-metric-tpy mill will be Canada's largest hardwood market pulp mill. Daishowa estimates that the mill will employ 330 employees, with an additional 300 employed in harvesting local aspen.

While engineering plans were not available, it is known that the mill will use oxygen delignification rather than the traditional kraft bleaching process, which is suspected of producing dioxin in wastewater discharge. "Environmentally, the mill will be the cleanest bleached kraft pulp mill in Canada, and it will also be one of the most pollution-free in North America," said Leroy Fjordbotten, Alberta forestry minister.

Daishowa plans to market most of the mill's output in Japan, and the remainder in the U.S., Europe and Asia, according to Koichi Kitagawa, Daishowa Canada Ltd.'s general manager. H.A. Simons of Vancouver will be the main consultant on the project. Negotiations to procure equipment for the mill plant are to begin immediately. ■

Wastepaper use becoming more attractive; chemicals benefit

Consumption. Wastepaper collection rose 5.5% in 1987 to 23.2 million short tons, mostly boosting exports, while domestic consumption stood at 19 million short tons. Because of the soaring price of market pulp, secondary fiber is becoming an attractive furnish for tissue, newsprint, and some printing and writing grades. Linerboard and corrugating medium producers are also findng it useful as boxboard rules flex and formation technologies improve. The falling dollar has greatly influenced the export scene, particularly along the Pacific Rim.

North American consumption growth can be attributed to the new projects developed recently. In brown paperstock (OCC, kraft clippings), Temple-Inland Inc., Interstate, Packaging Corp. of America, and Chesapeake Corp. completed projects that consume almost 600,000 tpy. In white paperstock (ledger, book, envelope, etc.), over 1 million short tons is being or will be used to supply Fort Howard Corp.'s two new tissue machines at Rincon, Ga., and new or expanded newsprint machines at Ontario Paper Co., Thorold, Ont.; Stora Forest Industries, Port Hawkesbury, N.S.; Cascades Inc., Niagara Falls, N.Y.; Garden State Paper Co., Garfield, N.J.; Southeast Newsprint, Dublin, Ga.; and Newsprint South, Grenada, Miss.

These expansions, along with the new inks and binders used in advanced printing processes, have made performance of chemicals for dispersion, flotation, and agglomeration a concern of users. Suppliers are focusing on programs and single formulations for these functions. Commodity chemicals have enjoyed only a bit of this heightened interest.

Producers of sodium silicate indicated that markets are improving only slightly ahead of last year, and use in secondary fiber processing is really flat since users are applying it more efficiently. Sodium silicate use in pulp production will grow as a peroxide stabilizer. Caustic use in this area is also flat. The washing process, which is actually more popular in recent expansions, uses more chemical, of which specialty formulations are getting the lion's share. The flotation process, once thought of as the savior from chemicals, seems to be attracting the smaller manufacturers who also turn to formulations for their deinking needs. Conversion to hydrogen peroxide as a bleacher of deinked and mechanical pulps is said to be occurring at a slow but steady pace.

The suppliers of formulations, as programs and under single trade names, expressed enthusiasm about the present market conditions. Many products under development or trial are finally being accepted by users. Although many users continue to hail mechanical treatment as the chief deinking component, the realities of new printing processes and higher sheet quality are giving chemicals a wider proving ground. Consumption is up and will move further in the future.

Suppliers mentioned that new products are coming out, mostly inside already established programs. Buckman Laboratories Inc. achieved great success last year with the "Repulping, deinking test kit," which allows users to check paperstock sources vs chemical demand. The kit helped move Busperse 288, a dispersant, into the market and assisted other older products in gaining more attention. Other product introductions include an ultraviolet-cured ink disperser from Nalco Chemical, a new product line from Reilly-Whiteman for retention and drainage, and process chemicals from Santek Chemicals.

One big area of interest among suppliers and users alike is what to do about laser inks. Users complain that the relatively new inks, used in ink-jet printers and computer printout (CPO) stock, are a chief cause of stickies and spots in finished sheets. There have been many new suppliers claiming to have the answer: Laserbusters, Resin Research Laboratories, Kimberly-Clark, and Dainippon Ink. The known suppliers are also working with deinkers within their product lines.

Availability, price. A few plant startups will expand the availability of chemicals. Horizon Chemicals has opened a plant in Houston, Texas, for surfactants. National Silicates will build a facility in Whitecourt, Alta. Interox plans to generate hydrogen peroxide in Longview, Wash.

In other news of suppliers, Du Pont sold its sodium silicate plants (Augusta, Ga., Fortville, Ind., and Pineville, La.) to Power Silicates of Melbourne, Australia. The U.S. base of Power Silicates is in Claymont, Del., and it will produce 70,000 tpy. Power joins Chemical Products, PQ Corp., and Occidental as the chief merchants of sodium silicate, accounting for over 65% of the 1.25 million short tons produced each year.

Prices of the commodities have moved upward throughout 1987. Caustic prices are approaching or have surpassed the $200/ton level. According to one source, sodium silicate lags behind caustic and soda ash price changes, and, indeed, PQ Corp. effected a 5% increase in the final quarter of last year. It is unlikely that prices will move higher in 1988. Hydrogen peroxide is seen by some as in oversupply, and list prices do not reflect current market rates.

All producers mentioned the competitiveness of specialty products and that each is priced on a very competitive basis. Most dispersants, surfactants, coagulants, etc. run from $1 to $2/dry lb, depending on strength and performance. Suppliers suggested some movement to the upper end of that range, primarily due to the increasing needs of the user. ■

—*Michael Ducey*

TABLE 1: **Consumption and price of chemicals consumed in deinking.**

Chemical	Consumption in recycling (short tons)	Change (1986-87)	Price[1] ($/short ton)
Caustic	13,625	4.0%	0.100[2]
Sodium silicate	11,900	2.5%	0.157[3] 0.666[4]
Hydrogen peroxide	5,700	4.0%	0.3225[5]

1. Source: *Chemical Marketing Reporter.* 2. 50% basis. 3. Anhydrous glass basis. 4. Solution. 5. 50% basis.

FLUFF PULP GROWTH SLOWING DUE TO LOWER BIRTHRATE, SUPERABSORBENTS

Growth of "ultra" diapers hurt demand last year, and further displacement could come from new synthetic fibers

By WILL MIES, Executive News Editor

Fluff pulp demand has been the fastest growing major end use for the U.S. market pulp industry, with consumption rising at about a 7% to 8% average annual rate during the past decade. But in 1987 U.S. consumption was believed to have declined, and domestic demand is expected to show relatively slow growth through the 1990s, due to a number of factors. These include lower U.S. birthrates, the already high penetration of disposables in this country, and the growing use of superabsorbent material in new thinner "ultra"-style baby diapers, which contain less fluff pulp.

As if this were not enough, new materials are being studied that could lead to even further displacement of fluff pulp. Synthetic thermoplastic fibers may be mixed with fluff pulp in the design of even stronger but thinner absorbent pads, baby diapers, and adult incontinence products. And Johnson & Johnson (J&J) plans to process sphagnum moss as a low-cost absorbent material at an idle sulfite pulp mill in Quebec in perhaps the most unusual development of all.

On the positive side, however, fluff pulp producers should enjoy healthy export demand due to increasing use of disposable diapers in Europe, Japan, and many developing countries. And the growing use of adult incontinence products by an aging U.S. population should help offset any loss in fluff demand for use in domestic baby diaper production. Many of these trends affecting fluff pulp were discussed at the recent Insight '87 nonwovens conference in Toronto that was sponsored by Miller Freeman Publications, which publishes *Pulp & Paper* and which recently acquired *Nonwovens World*.

TABLE 1: **Projected U.S. disposable infant diaper unit growth.**

	Market share[1] (%)	Billion usage
1980	60.0	12.2
1985	75.5	16.4
1990	83.9	19.4
1995	90.8	20.0
2000	93.3	19.6

1. Market share is defined as the percentage of the total potential market for diapers if all 30-month infants were to use disposable diapers at the rate of 6.6 changes per day.
Source: Marketing/Technology Service Inc.

SLOWER DIAPER GROWTH. U.S. domestic fluff pulp demand is projected to increase by about 80,000 metric tons from 1987 through the year 2000, according to Kenneth E. Lowe, an author of a new report recently released by Marketing/Technology Service (MTS) of Kalamazoo, Mich. This is a drastic change from the recent past, in which domestic fluff pulp consumption increased by nearly 200,000 tons over the past six years (Table 2).

"Unit demand for infant diapers will increase at a slower rate over the next decade due to lower birthrates and to slower growth in disposable market share," he told the Insight meeting. Currently, disposable diapers have captured about 78% of the U.S. market, but future growth at the expense of cloth diapers will be slower, with the share held by disposables rising to more than 90% by the year 2000.

TABLE 2: **Projected U.S. consumption of fluff pulp by end use (000 metric tons).**

	Total[1]	Infant diapers[2]	Adult incontinence products[3]
1981	807	548	89
1985	885	618	103
1987	901	715	121
1989	883	685	138
1991	913	699	158
1993	936	701	182
1995	952	697	204
1997	964	699	223
1999	977	684	243
2000	982	679	252

1. Includes fluff pulp consumed in feminine pads.
2. Based on the forecast that the market share for superabsorbent diapers will steadily increase through the year 2000.
3. Retail and institutional.
Source: Marketing/Technology Service Inc.

At the same time, the 30-month population of infants in the U.S. is projected to peak around 1990 and then decline to the year 2000. "The net result is that demand for disposable diapers will increase by only 11% from 1987 to 2000, or from about 17.8 billion to 20 billion units," according to Lowe.

SUPERABSORBENT REVOLUTION. At the same time, the growing use of superabsorbents is reducing the amount of fluff pulp required per diaper by about 30%. Superabsorbents have the capacity to absorb up to 50 times their weight in liquid and therefore permit the design of thinner baby diapers and less obtrusive adult incontinence products. Typically, about 5 g of superabsorbent material (usually polyacrylate powder or granules) is used per diaper. This results in a reduction in the weight of fluff pulp used in an average infant diaper from 50 g to 34.7 g—or about 30%, according to Lowe.

Since their introduction less than two years ago, the new diapers containing superabsorbents have captured more than 50% of the U.S. diaper market and may have 93% of the market by 1990, Lowe said. (Availability of the superabsorbent polymer was a problem when the thin diapers were first introduced, but the market is now approaching serious oversupply as producers such as Dow Chemical, Hoechst Celanese, and Chemdal have expanded capacity, according to David F. Phillips, another consultant. Price of the material is currently moving into the $1/lb range, down from over $2 less than six months ago.)

With the increasing use of superabsorbents, U.S. fluff pulp consumption for use in baby diapers dropped from an estimated 811,000 tons in 1986 to 715,000 tons in 1987 and is forecast to decline to 691,000 tons by 1990 and 680,000 tons by the year 2000, Lowe said.

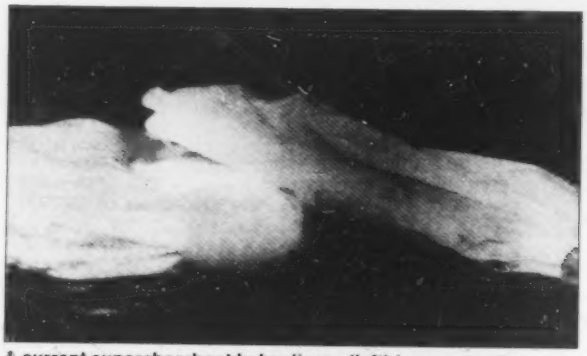
ADULT INCONTINENCE. "The dropoff in fluff pulp demand for infant diapers will be made up largely by improved demand for fluff in adult incontinence products," Lowe noted. Demand for adult incontinence products is expected to show strong growth due to an aging U.S. population and market penetration by disposables. Adult incontinence products currently consume about 121,000 tons of fluff pulp (about equally divided between retail and institutional markets), and demand is projected to double to 252,000 tons by the year 2000.

As a result, overall U.S. domestic demand for fluff pulp will remain nearly constant, rising from about 900,000 tons in 1987 to 982,000 tons by the year 2000. The share of fluff pulp consumed in baby diapers will decline from the current 81% to 69% by the year 2000, while use in adult incontinence products will rise from 6% to 26%. Usage in feminine pads will remain relatively stable at 5% to 6%.

FLUFF INDUSTRY STRUCTURE. Stronger growth in export demand for fluff pulp will help total U.S. pulp production, Lowe said. According to the MTS study, *North American Fluff Pulp Markets and Prospects for 1987-2000*, U.S. fluff pulp production will total about 1.6 million tons in 1987, of which about 900,000 tons will be consumed in the domestic market and about 740,000 tons will be exported.

North America supplies about 70% of total world fluff pulp demand. Total U.S. effective capacity is estimated at nearly 2.0 million tons (mainly consisting of southern pine kraft pulp). Major producers with capacity shares over 20% include Buckeye Cellulose Co., Weyerhaeuser Co., and International Paper Co. Next largest are ITT Rayonier Inc. at around 14% and Kimberly-Clark Corp. at close to 9%, according to MTS.

Total world effective capacity is estimated at 2.8 million metric tons, of which 835,000 tons is outside North America (Table 3). Most of this capacity is in western Europe and includes about 195,000 tons of bleached chemi-thermomechanical/thermomechanical pulp. Major European players include Stora Kopparberg, La Cellulose du Pin, Korsnäs-Marma, and Metsä-Serla.



A current superabsorbent baby diaper (left) is compared to a thermally bonded SAP diaper. The thermally bonded diaper has a 28.2-g core, compared to 45.6-g for the current diaper.

A photomicrograph shows how core stability results from the melting of Pulpex to form "solder joints," or collapsed fibrils, within the cellulose matrix of the diaper core.

SYNTHETIC FIBERS. Another major new development that could lead to the further displacement of fluff pulp is the possible use of synthetic fibers in combination with fluff. The synthetic fiber that is being most widely experimented with is Hercules Pulpex (Type E 338), which is similar in length and morphology to woodpulp.

At least two U.S. fluff pulp producers, Weyerhaeuser Co. (at Plymouth, N.C.) and Temple-Eastex Inc.(at Evadale, Texas) are offering fluff blends containing about 15% to 20% polyethylene fibers. Such blends can be thermally bonded by the absorbent products converter using either through-air bonding (Honeycomb Systems) or infrared heating equipment (Scandimex of Sweden).

When heated to near its melting point, the plastic fibers bind all of the fibers in the pad. As a result, the pad maintains its shape better and does not collapse upon wetting. By maintaining many void spaces, the pad can absorb a greater volume of liquid, according to Peter G. Bither, director of strategy for Hercules Inc. Special finishing on the plastic fibers also improves wicking of liquid into surrounding core material, while the greater structural integrity of the pad permits better utilization of superabsorbent material.

As a result of these advantages, absorbent products can be designed that are thinner, lighter, and stronger. However, the fluff pulp/polymer fiber blends are significantly more expensive (about $900/metric tons vs $560 for 100% southern pine fluff pulp). "Absorbent products manufacturers will have to make their own decisions based on comparing strength and design benefits against the higher cost of the synthetic fiber and the capital cost for thermal bonding," David P. Graves Jr. of Weyerhaeuser told the Insight meeting.

"While Pulpex fluff pulp blend sheets are currently priced 30% to 60% more than normal fluff pulp, core weights in absorbent products can usually be reduced enough to compensate for the higher priced material—especially when superabsorbent material is also included," Bither noted. As an example, he compared an "ultra"-type diaper (45-g core) with a similar Pulpex-bonded diaper (28-g core). Both diapers had similar liquid retention (450 to 500 ml), but the Pulpex-bonded version would be 9% to 15% less expensive to produce, he said. Already a few products using this new technology are starting to be marketed in Europe, the U.S., and Japan.

SPHAGNUM MOSS. The most unusual new development is the joint venture between Johnson & Johnson Inc. of Montreal and St. Raymond Paper Co. to produce a new absorbent material made from purified sphagnum moss at the latter's Desbiens, Que., sulfite pulp mill. The sphagnum material is said to offer twice the absorption capability of fluff pulp and will cost about 15¢/lb vs more than 25¢ for fully bleached fluff woodpulp. Production is scheduled to begin in early 1989.

J&J has been studying the use of moss for about ten years. It purchased about ten square miles of moss-covered land several years ago and has a pilot plant which processes about two or three tons of material a month. A major concern for J&J has been the color of the moss, which naturally ranges from off-white to dark brown. The company has developed a process to bleach it to an acceptable white color, sanitizing it at the same time. The St. Raymond mill had capacity to produce about 120 tpd of unbleached sulfite pulp before it was shut down in 1981. The joint venture will invest about C$20 million to reopen it, with some federal and provincial financial assistance.

While J&J vice president-research Angelo Ruffo notes that "the reaction of most people is incredulity," the new product may not be as strange as it sounds. Among Eskimo tribes, sphagnum has long been used as an absorbent material.

CUSTOMER SHAKEOUT? While fluff pulp manufacturers may be facing a dim future, some of their customers in the disposable products business may not be around at all.

TABLE 3: **Estimated world fluff pulp supply (000 metric tons).**

Pulp grade	North America	Other[1]
Sulfite[2]	140	280
Sulfate[2]	1,815	380
CTMP/TMP[3]		195
Totals:	**1,955**	**855**

1. Mainly western European.
2. Bleached softwood chemical paper-grade pulp.
3. Bleached pulp. CTMP supply in North America is to come online in 1987.

Source: Marketing/Technology Service Inc.

New superabsorbent diapers from producers such as Procter & Gamble, Kimberly-Clark, and Weyerhaeuser are sweeping the U.S. market—and babies seem to like them.

The baby diapers business in the last few years has been marked by intense product development activity and shorter product cycles. About 80% of the U.S. diaper market is held by two companies: Procter & Gamble Co. (P&G, with Pampers and Luvs at about 50%) and Kimberly-Clark (K-C, with Huggies at slightly over 30%). The remainder is split among more than a dozen companies (the largest include J&J's Chicopee Div., Weyerhaeuser, Georgia-Pacific Corp., Whitestone Products, and Pope & Talbot Inc.), which may have increasing difficulty keeping up with the new high rate of product innovation, according to James P. Hanson, director of Marketing/Technology Service.

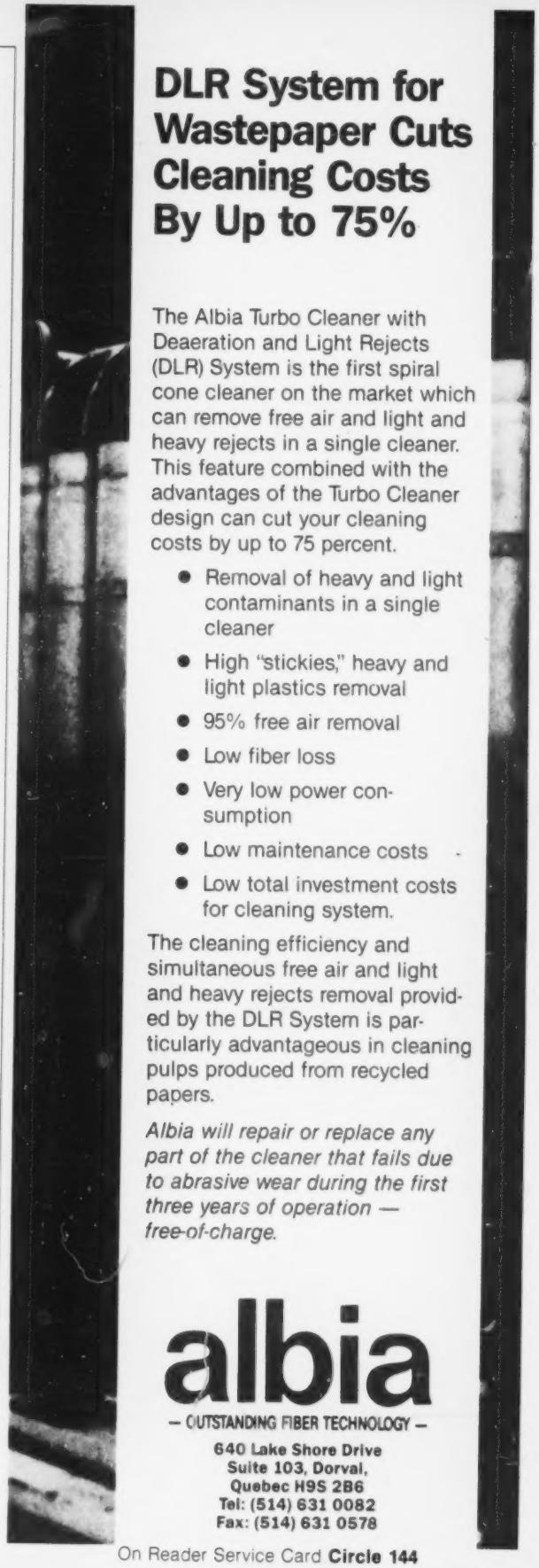
While most private-label producers have been able to adopt "ultra" superabsorbent diaper technology, they may have more difficulty imitating the next round of P&G design. Both P&G and K-C are now contouring the absorbent core of their diapers using complex pocket forming machinery, which will be difficult for smaller independents to duplicate and still avoid patent problems, Hanson noted.

JAPANESE INNOVATIONS. Many of the new innovations in diaper design have been coming from Japan, where the baby diaper market has been skyrocketing. These innovations have included use of superabsorbents, multiple elastic legs, breathable legs, breathable backing film, waistbands, various coverstock innovations, elastic tape tabs, and thermal bonding of absorbent cores, according to Hanson.

Demand for baby diapers in Japan has been growing at a rate of 40% to 70% annually since 1984, and market size has reached about US$660 million (2.5 billion units), according to Hiroshi Mizutani, director of new business development for Kao Corp. Growth was slower in 1987, while a number of new companies (including some paper companies) have entered the market, resulting in intense price competition.

The disposable diaper share of the Japanese market has grown from about 8% in the early 1980s to 34% in 1986 and is projected to reach 64% by 1990, according to Akira Takeuchi of Uni-Charm Corp. The market share held by Kao (Merries) has been fairly stable the last couple of years at about 33%. Uni-Charm's share (Moony, Mamypoko, Ultra-Moony) has declined from about 46% in 1985 to 31% in last May and June, he noted. P&G (Pampers)—which had 89% of the market in 1981—finally appears to be reversing its market share losses, climbing from 9% to 17% over the last two years.

Development in Europe has been slower, although around 1980 Beghin-Say (Lotus) and Vereinigte Paperwerke (Born) were the first producers anywhere to introduce baby diapers containing small amounts of superabsorbent material. Now most producers (including P&G, Colgate-Palmolive Co., and Peadouce) are coming out with "ultra"-type diapers in a burst of product development activity, according to Hanson. ■



DLR System for Wastepaper Cuts Cleaning Costs By Up to 75%

The Albia Turbo Cleaner with Deaeration and Light Rejects (DLR) System is the first spiral cone cleaner on the market which can remove free air and light and heavy rejects in a single cleaner. This feature combined with the advantages of the Turbo Cleaner design can cut your cleaning costs by up to 75 percent.

- Removal of heavy and light contaminants in a single cleaner
- High "stickies," heavy and light plastics removal
- 95% free air removal
- Low fiber loss
- Very low power consumption
- Low maintenance costs
- Low total investment costs for cleaning system.

The cleaning efficiency and simultaneous free air and light and heavy rejects removal provided by the DLR System is particularly advantageous in cleaning pulps produced from recycled papers.

Albia will repair or replace any part of the cleaner that fails due to abrasive wear during the first three years of operation — free-of-charge.

albia

— OUTSTANDING FIBER TECHNOLOGY —

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